Unit 5: Games and Graphics

Mission 15: Handball

Intro and Discussion Points:

In this project, students will build a handheld gaming framework, culminating in a fun, playable game. This lesson is the first of a 2-part Mission sequence to develop a retro video game of *American Handball*:

- The game is like a 1-player version of the classic "Pong".
- Buttons move a paddle side-to-side across the bottom of the screen.
- A ball bounces off the sides and top of the screen.
- Score points by hitting the ball with your paddle.
- You get 3 "lives" - lose those balls and it's GAME OVER!

CodeX Lesson Plans

UNIT 4: Games and Graphics

MISSION 15: Handball

# DAYS: 5

UNIT GOALS: Students will create advanced graphics and design games with the CodeX.

ADDITIONAL MATERIALS:

- none

VOCABULARY:

- Velocity
- Distance
- Time
- Initialization
- Decrement

FOCUS CSTA STANDARDS: 2-AP-10, 2-AP-12, 2-AP-14, 3-AP-14

LEARNING TARGETS:

- I can code a basic physics game engine.
- I can use multiple functions to draw the ball, update position, clear screen, etc.
- I can use angles to control the ball rebounds.
- I can use *delta time* instead of *sleep* to manage a fast-paced game.
- I can manage the game state by initializing the game, updating the game state, and handling game over.

SUCCESS CRITERIA:

□ Define and call 12 functions.
□ Draw a screen layout for the game.
□ Use CodeX buttons as event handlers for the game.
□ Keep track of score and lives.
□ Create 2 animated objects in the game: paddle and ball.

KEY CONCEPTS:

- Use functions to organize your code into reusable blocks: paddle position, collision check, updating score, etc.
- Use constants for variables that don't change.
- Declare and Initialize variables as local or global.
- Focus and refine your game's user experience (UX).
- Implement collision detection algorithms to detect collisions between the ball and other game objects, such as the paddle or the walls.

DISCUSS REAL WORLD APPLICATIONS:

- You're creating a very basic physics engine here! The code in this mission models the mechanics of velocity, distance, and time.
- You are using SOHCAHTOA: trigonometric functions sine, cosine, and tangent to calculate ball angles.
- This game provides hands-on experience in creating a simple yet engaging game, allowing learners to understand game mechanics, collision detection, user input handling, and basic game design.

ASSESSMENT STRATEGIES:
Remix suggestions (set aside 0.5-1.5 periods to complete):

- Introduce power-ups that appear randomly during gameplay. For example, a larger paddle power-up that makes the paddle temporarily bigger, or a slow-motion power-up that slows down the ball's movement for a short duration.
- Add obstacles on the playfield that the player must navigate around while keeping the ball in play. These obstacles could move or change position, adding an extra layer of challenge to the game.
- Provide players with the ability to customize their paddle's appearance or choose different themes for the game. This could include changing the paddle's color, adding decals, or selecting different background graphics.
- Implement a progression system where players can unlock new paddle designs, backgrounds, or gameplay modifiers as they progress through the game or achieve certain milestones.

TEACHER NOTES:
Always refer to **Appendix A:** All the instructions from CodeSpace and CodeTrek are there.